SOLAR BATTERY MODULE AND ITS MANUFACTURING METHOD

Patent Number: JP2002118276
Publication date: 2002-04-19
Inventor(s): TACHIBANA SHINGO
Applicant(s): SHARP CORP
Requested Patent: ☐ JP2002118276
Application Number: JP20000307824 20001006
Priority Number(s):
IPC Classification: H01L31/042
EC Classification:
Equivalents:

Abstract

PROBLEM TO BE SOLVED: To provide a solar battery module the peripheral section of which can be sealed by means of a front cover, a back cover, and a filling resin layer only and, to provide a method of manufacturing the module.
SOLUTION: The solar battery module 1 is provided with a front cover 2 on the light receiving surface sides of solar battery cells 5, the back cover 3 on the opposite surface sides of the cells 5, and the filling resin layer 4 between the covers 2 and 3 and cells 5. The front cover 2 and back cover 3 are joined to each other in the peripheral section of the module 1 and the peripheral edge of the filling resin layer 4 is sealed on at least either one of the front cover 2 and back cover 3.

Solar Battery Module and Its Manufacturing Method

(Machine Translated Version)

[Claim(s)]

[Claim 1] The solar cell module which a front cover is allotted to the light-receiving side side of a photovoltaic cell, back covering is arranged on the opposite side side, and a front cover and back covering are joined by the periphery of said solar cell module in the solar cell module with which the restoration resin layer was prepared between each covering and a photovoltaic cell, and is characterized by the thing of a front cover and back covering done for the closure of the periphery of a restoration resin layer in either at least.

[Claim 2] It is the solar cell module according to claim 1 characterized by for said front cover consisting of a film and said back covering consisting of a substrate.

[Claim 3] It is the solar cell module according to claim 1 characterized by for said front cover consisting of a substrate and said back covering consisting of a film.

[Claim 4] It is the solar cell module according to claim 1 characterized by for said front cover consisting of a surface film, and said back covering consisting of a rear-face film.

[Claim 5] The solar cell module characterized by having allotted the front cover to the light-receiving side side of a photovoltaic cell, having arranged back covering on that opposite side side, having prepared the inactive member between a front cover and back covering by the periphery of said solar cell module in the solar cell module with which the restoration resin layer was prepared between each covering and a photovoltaic cell, and the closure of the periphery of a restoration resin layer being carried out by this inactive member.

[Claim 6] The manufacture approach of the solar cell module which is the manufacture approach of a solar cell module according to claim 2 or 3, and is characterized by maintaining the condition of having pressurized the film circumference edge in the direction of a substrate until a restoration resin layer hardens and constructs a bridge, in case a film, a photovoltaic cell, and a substrate are laminated by the restoration resin layer.

[Claim 7] The manufacture approach of the solar cell module which is the manufacture approach of a solar cell module according to claim 2 or 3, and is characterized by pressurizing a film circumference edge in the direction of a substrate, heating after it laminates a film, a photovoltaic cell, and a substrate by the restoration resin layer and a restoration resin layer hardens and constructs a bridge.

[Claim 8] The manufacture approach of the solar cell module characterized by pressurizing a film in the direction of a substrate in a field in the manufacture approach of a solar cell module according to claim 6 or 7.

[Claim 9] The manufacture approach of the solar cell module which is the manufacture approach of a solar cell module according to claim 4, and is characterized by maintaining the condition of having pressurized the direction of a rear-face film, and the rear-face film circumference edge for the surface film circumference edge at the direction of a surface film or a front face, and rear-face film both directions until a restoration resin layer hardens and constructs a bridge, in case a surface film, a photovoltaic cell, and a rear-face film are laminated by the restoration resin layer.

[Claim 10] The manufacture approach of the solar cell module which is the manufacture approach of a solar cell module according to claim 4, and is characterized by maintaining the condition of having pressurized the direction of a rear-face film, and the rear-face film circumference edge for the surface film circumference edge at the direction of a surface film or a front face, and rear-face film both directions, heating after it laminates a surface film, a photovoltaic cell, and a rear-face film by the restoration resin layer and a restoration resin layer hardens and constructs a bridge.

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to a solar cell module and its manufacture approach.

[0002]

[Description of the Prior Art] A solar cell module is the aggregate which connected the photovoltaic cell. However, there is a problem in using it outdoors from a viewpoint of the engine performance on the strength, damp-proof ability, and the insulating engine performance in a photovoltaic cell simple substance. For this reason, as shown in drawing 7 , it is almost the case which is constituted with a front cover 61, the back covering 62, restoration resin 63, and the circumference edge sealing agent 64 so that the engine performance (based on a front cover 61 or the back covering 62) on the strength, damp-proof ability (based on a front cover 61, the back covering 62, and the circumference edge sealing agent 64), and the insulating engine performance (based on a front cover 61, the back covering 62, restoration resin 63, and the circumference edge sealing agent 64) may be secured. The restoration resin 63 currently used here has the point which poses a problem as an electric product that water will penetrate instead of having the light transmission engine performance and ultraviolet resistance ability, and the insulating engine performance. For this reason, the approach of closing the circumference edge of a solar cell module is offered variously that it should prevent that the moisture content which becomes a problem trespasses upon the restoration resin 63 interior.

[0003] Moreover, as the manufacture approach of a solar cell module, as shown in drawing 8 , on the hot platen around 130 degrees C, the vacuum press is performed and temporary adhesion of what was accumulated in order of a front cover 61 (or back covering 62), sheet-like restoration resin 63 (EVA resin etc.), a photovoltaic cell 60, sheet-like restoration resin 63 (EVA resin etc.), and the back covering 62 (or front cover 61) is carried out. The method of hardening and pasting this up in the oven around 150 degrees C, and finally attaching a circumference edge sealing agent is in use.

[0004] There are various kinds of methods shown in drawing 9 thru/or drawing 12 in the closure approach by the circumference edge sealing agent. These methods are outlined below.

(1) The compression closure method 1 (refer to drawing 9) by the frame : the approach which attach Frame D where member 64a (isobutylene isoprene rubber, resin foam, etc.) which has the closure engine performance by being compressed is twisted around the perimeter edge of a solar cell module 6 in which the frame is not attached, and closes by performing eye a flask clamp. In addition, in drawing 9 and drawing 10 , drawing (a) is a

decomposition perspective view showing the whole solar cell module 6, and drawing (b) is a XX sectional view in drawing (a).
(2) The compression closure method 2 (refer to drawing 10) by the frame : the approach which closes by performing eye a flask clamp where member 64a (isobutylene isoprene rubber, resin foam, etc.) which has the closure engine performance by being compressed into Frame D is attached.
(3) Sealing agent spreading method 1 (refer to drawing 11) : how to pour in and close sealing agent 64b (silicone resin, adhesives, etc.), after Frame D is attached.
(4) Sealing agent spreading method 2 (refer to drawing 12) : the method which applies sealing agent 64b (silicone resin, adhesives, etc.) to the perimeter edge of a solar cell module 6 in which the frame is not attached, and is closed (refer to drawing 12 (a) and (b)). In addition, when a frame is required, a frame is attached after sealing agent 64b spreading.
[0005]
[Problem(s) to be Solved by the Invention] However, by the compression closure method by the above-mentioned frame, a frame is needed and it cannot respond to a frame-less solar cell module with the increasing present needs.
[0006] Moreover, by the sealing agent spreading method, there was a problem that the cleaning at the time of adhering to the location I do not want a sealing agent to adhere which requires the time amount which applies and stiffens a sealing agent and which soils the inside of a production process took time and effort etc.
[0007] Furthermore, since another member for closing was needed, each above-mentioned method also had the trouble that cost started.
[0008] This invention is created in view of the above situations, and aims at offer of the solar cell module which can perform the circumference edge closure of a solar cell module only in a front cover, back covering, and a restoration resin layer, and its manufacture approach.
[0009]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, a front cover is allotted to the light-receiving side side of a photovoltaic cell, back covering is arranged on the opposite side side, a front cover and back covering are joined by the periphery of said solar cell module in the solar cell module with which the restoration resin layer was prepared between each covering and a photovoltaic cell, and this invention is characterized by the thing of a front cover and back covering done for the closure of the periphery of a restoration resin layer in either at least.
[0010] According to this invention, the closure of the periphery of a solar cell module can be performed only in a front cover, back covering, and a restoration resin layer.
[0011] It is characterized by for said front cover consisting of a film in this invention, and said back covering consisting of a substrate.
[0012] According to this invention, the closure of the periphery of the so-called solar cell module of substrate structure can be performed only in a film, a substrate, and a restoration resin layer.
[0013] It is characterized by for said front cover consisting of a substrate in this invention, and said back covering consisting of a film.
[0014] According to this invention, the closure of the periphery of the so-called solar cell module of super straight structure can be performed only in a film, a substrate, and a

restoration resin layer.
[0015] It is characterized by for said front cover consisting of a surface film in this invention, and said back covering consisting of a rear-face film.
[0016] According to this invention, the closure of the periphery of the solar cell module of front flesh-side film structure can be performed only in a surface film, a rear-face film, and a restoration resin layer.
[0017] A front cover is allotted to the light-receiving side side of a photovoltaic cell, back covering is arranged on that opposite side side, an inactive member is prepared between a front cover and back covering by the periphery of said solar cell module in the solar cell module with which the restoration resin layer was prepared between each covering and a photovoltaic cell, and this invention is characterized by the closure of the periphery of a restoration resin layer being carried out by this inactive member.
[0018] According to this invention, the closure of the periphery of a solar cell module can be performed by the front cover, back covering, the restoration resin layer, and the inactive member.
[0019] This invention is the manufacture approach of a solar cell module, and it is characterized by maintaining the condition of having pressurized the film circumference edge in the direction of a substrate until a restoration resin layer hardens and constructs a bridge, in case a film, a photovoltaic cell, and a substrate are laminated by the restoration resin layer.
[0020] This invention is the manufacture approach of a solar cell module, and after it laminates a film, a photovoltaic cell, and a substrate by the restoration resin layer and a restoration resin layer hardens and constructs a bridge, it is characterized by pressurizing a film circumference edge in the direction of a substrate, heating.
[0021] This invention is characterized by pressurizing a film in the direction of a substrate in a field in the manufacture approach of a solar cell module.
[0022] According to this invention, field contact of a film and the substrate can be carried out without a clearance.
[0023] This invention is the manufacture approach of a solar cell module, and it is characterized by maintaining the condition of having pressurized the direction of a rear-face film, and the rear-face film circumference edge for the surface film circumference edge at the direction of a surface film or a front face, and rear-face film both directions until a restoration resin layer hardens and constructs a bridge, in case a surface film, a photovoltaic cell, and a rear-face film are laminated by the restoration resin layer.
[0024] This invention is the manufacture approach of a solar cell module, and it is characterized by maintaining the condition of having pressurized the direction of a rear-face film, and the rear-face film circumference edge for the surface film circumference edge at the direction of a surface film or a front face, and rear-face film both directions, heating, after it laminates a surface film, a photovoltaic cell, and a rear-face film by the restoration resin layer and a restoration resin layer hardens and constructs a bridge.
[0025]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to drawing.
[0026] A front cover 2 is allotted to the light-receiving side side of a photovoltaic cell 5, the back covering 3 is arranged on the opposite side side, and, as for the solar cell module 1 of this invention, it comes to prepare the restoration resin layer 4 between each

coverings 2 and 3 and a photovoltaic cell 5.
[0027] First, the gestalt of operation of the 1st of this invention is explained. A front cover 2 is the so-called solar cell module 1 of the substrate structure where the film 20 with the transparent gestalt of this operation and the back covering 3 consist of substrates 30. Drawing 1 is the expanded sectional view of the circumference edge of the solar cell module 1 concerning the gestalt of this operation.
[0028] EVA resin etc. is suitably used for the restoration resin which forms a transparence TEDORA film etc. in a film 20, and forms the restoration resin layers 4, such as an aluminum plate, in a substrate 30.
[0029] The film 20 touches over the perimeter of the periphery of a substrate 30 that there is no clearance in a substrate 30, and the closure of the periphery of the restoration resin layer 4 is planned. In addition, the edge of the periphery of a substrate 30 is sufficient as a film 20 contacting a substrate 30, and it may be carrying out field contact that there is no clearance in a substrate 30.
[0030] Although the solar cell module of the conventional substrate structure was shown in drawing 13 , it was the structure which the restoration resin outcrop 600 which moisture penetrates has elegance in a circumference edge, and has a problem the way things stand conventionally [this] on weatherproof ability (on the engine performance it is made for moisture not to penetrate to a photovoltaic cell through restoration resin). However, in the solar cell module 1 concerning the gestalt of this operation, in a circumference edge, there is almost no exposure of the restoration resin layer 4, and it has the structure of making the moisture content penetrated to a photovoltaic cell 5 decreasing sharply. Moreover, it becomes unnecessary [another member for the edge closure which was the need conventionally].
[0031] Next, the gestalt of operation of the 2nd of this invention is explained. A front cover 2 is the so-called solar cell module 1 of the super straight structure where the substrate 21 with the transparent gestalt of this operation and the back covering 3 consist of films 31. Drawing 2 is the expanded sectional view of the circumference edge of the solar cell module 1 concerning the gestalt of this operation.
[0032] EVA resin etc. is suitably used for the restoration resin which forms glass etc. in a substrate 21 and forms the restoration resin layer 4, such as a white film, in a film 31.
[0033] The film 31 touches over the perimeter of the periphery of a substrate 21 that there is no clearance in a substrate 21, and the closure of the periphery of the restoration resin layer 4 is planned. In addition, the edge of the periphery of a substrate 21 is sufficient as a film 31 contacting a substrate 21, and it may be carrying out field contact that there is no clearance in a substrate 21.
[0034] It was the structure which the restoration resin outcrop 600 which moisture penetrates has elegance in a circumference edge, and has a problem the way things stand conventionally [this] on weatherproof ability (on the engine performance it is made for moisture not to penetrate to a photovoltaic cell through restoration resin) like [although the solar cell module of the conventional super straight structure is shown in drawing 14] the thing of the above-mentioned substrate structure. However, in the solar cell module 1 concerning the gestalt of this operation, in a circumference edge, there is almost no exposure of the restoration resin layer 4, and it has the structure of making the moisture content penetrated to a photovoltaic cell 5 decreasing sharply. Moreover, it becomes unnecessary [another member for the edge closure which was the need conventionally].

[0035] Next, the gestalt of operation of the 3rd of this invention is explained. The surface film 22 with the gestalt of this operation transparent [a front cover 2] and the back covering 3 consist of rear-face films 32. Drawing 3 is the expanded sectional view of the circumference edge of the solar cell module 1 concerning the gestalt of this operation.
[0036] EVA resin etc. is suitably used for the restoration resin which forms the restoration resin layer 4, such as a white film, in the rear-face films 32, such as a transparence TEDORA film, at the surface film 22.
[0037] The surface film 22 touches over the perimeter of the periphery of the rear-face film 32 that there is no clearance in the rear-face film 32, and the closure of the periphery of the restoration resin layer 4 is planned.
[0038] It was the structure which the restoration resin outcrop 600 which moisture penetrates has elegance in a circumference edge, and has a problem the way things stand conventionally [this] on weatherproof ability (on the engine performance it is made for moisture not to penetrate to a photovoltaic cell through restoration resin) like [although the conventional solar cell module corresponding to the gestalt of this operation to drawing 15 is shown] the conventional article of the above-mentioned substrate structure and super straight structure. However, in the solar cell module 1 concerning the gestalt of this operation, in a circumference edge, there is almost no exposure of the restoration resin layer 4, and it has the structure of making the moisture content penetrated to a photovoltaic cell 5 decreasing sharply. Moreover, it becomes unnecessary [another member for the edge closure which was the need conventionally].
[0039] Next, it explains, referring to drawing 6 about the gestalt of operation of the 4th of the solar cell module 1 concerning this invention.
[0040] The inactive member 41 is formed between a front cover 2 and the back covering 3 by the periphery of a solar cell module 1, and, as for the gestalt of this operation, the closure of the periphery of the restoration resin layer 4 is carried out by this inactive member 41.
[0041] Drawing 6 (a) shows that by which the inactive members 41 (glass fabrics etc.) are formed between the film 20 and the substrate 30 by the periphery of a solar cell module 1 about the solar cell module 1 of the substrate structure of pasting up and stiffening substrate 30, restoration resin layer 4, photovoltaic cell 5, and a film 20, or super straight structure. Moreover, drawing 6 (b) shows that by which the inactive members 41 (glass fabrics etc.) are formed between the film 22 and the film 32 by the periphery of a solar cell module 1 about the solar cell module 1 of the front flesh-side film structure of pasting up and stiffening a film 22, and 32, restoration resin layer 4 and a photovoltaic cell 5. By preparing this inactive member 41, front cover 2, and back covering 3, and manufacturing a solar cell module 1, most exposure of the restoration resin layer 4 between the front cover 2 of a solar cell module 1 circumference edge and the back covering 3 can be lost. if a fluid good thing is used here as restoration resin which forms the restoration resin layer 4, without it will leave air bubbles etc. to the interior of the inactive member 41 -- an exterior -- it is finely producible. In addition, the films 20, 22, and 32 and the restoration resin layer 4 which have overflowed solar cell module 1 dimension are excised after restoration resin layer 4 hardening.
[0042] Next, the 1st thru/or the manufacture approach of the solar cell module 1 of the gestalt the 3rd operation are explained, referring to drawing 4 and drawing 5 .
[0043] Drawing 4 (a) is drawing in which using Fixture A for and showing how to carry

out pressurization processing of the film 20 circumference edge in the substrate 30 direction, in order to be in the condition re-softened the restoration resin layer 4 after adhesion, to use the edge of a substrate 30 circumference edge and to reduce exposure of restoration resin layer 4 edge, when carrying out temporary adhesion of a substrate 30, the restoration resin layer 4, a photovoltaic cell 5, and the film 20 on the hot platen around 120 degrees C or.

[0044] Drawing 4 (b) is drawing showing how to almost lose the restoration resin layer 4 between a substrate 30 and a film 20, in order to use the tooth space from photovoltaic cell 5 edge to substrate 30 edge, to use Fixture B in the substrate 30 direction, to pressurize a film 20 in it in a field and to reduce exposure of restoration resin layer 4 edge. The film 20 and the restoration resin layer 4 óverflowing from a substrate 30 circumference edge are excised after restoration resin layer 4 hardening.

[0045] In addition, although the above-mentioned manufacture approach explained substrate structure, it is the same also about super straight structure.

[0046] Drawing 5 is in the condition of having re-softened the restoration resin layer 4 after adhesion when carrying out temporary adhesion of the surface film 22, the restoration resin layer 4, a photovoltaic cell 5, and the rear-face film 32 on the hot platen around 120 degrees C. In order to use the tooth space from photovoltaic cell 5 edge to a film 22 and 32 edges, to use Fixture C in a film 22 and the 32 phase directions, to pressurize in a field and to reduce exposure of restoration resin layer 4 edge, they are a film 22 and drawing showing how to almost lose the restoration resin layer 4 between 32. The films 22 and 32 and the restoration resin layer 4 which have overflowed solar cell module 1 dimension are excised after restoration resin layer 4 hardening.

[0047] Moreover, the high-speed bridge formation article of restoration resin is developed by development of a technique in recent years. This high-speed bridge formation article can paste up and harden completely a substrate, restoration resin, and a photovoltaic cell film at the process only for carrying out temporary adhesion. It is also possible to maintain the condition of having pressurized using this high-speed bridge formation article so that a clearance might not almost be produced between the front cover of a solar cell module circumference edge and back covering, and to harden and paste up restoration resin.

[0048]

[Effect of the Invention] As explained above the solar cell module of this invention In the solar cell module which arranged the front cover to the light-receiving side side of a photovoltaic cell, arranged back covering on the opposite side side, and prepared the restoration resin layer between each covering and a photovoltaic cell Since a front cover and back covering are joined by the periphery of said solar cell module and it is characterized by the thing of a front cover and back covering for which the periphery of a restoration resin layer was closed in either at least The closure of the circumference edge of a solar cell module can be performed only in a front cover, back covering, and a restoration resin layer. Therefore, there is almost no exposure of a restoration resin layer in the edge of a solar cell module, and the moisture content penetrated from the interior of a restoration resin layer to a photovoltaic cell can be made to decrease sharply. Moreover, while another member for closing the circumference edge of a solar cell module is unnecessary and can reduce ingredient cost, it is reducible like the fitter of another member for the edge closures. Furthermore, it is effective also in the module

which has an acute angle triangular module part.
[0049] Since this invention is applied also when using a front cover as a film, using back covering as a substrate, using a front cover as a substrate, using back covering as a film, using a front cover as a surface film and using back covering as a rear-face film, it is applicable also to the solar cell module of the so-called substrate structure, super straight structure, and front flesh-side film structure.
[0050] When an inactive member is prepared between a front cover and back covering, the closure of the circumference edge of a solar cell module can be performed by the front cover, back covering, the restoration resin layer, and the inactive member, and the restoration resin layer exposure product of the periphery of a front cover and back covering can be made into the minimum.
[0051] Since this invention is the manufacture approach of the solar cell module characterized by to maintain the condition pressurized the film circumference edge in the direction of a substrate, or to pressurize a film in the direction of a substrate in a field, heating after hardening and constructing a bridge until a restoration resin layer hardens and constructs a bridge or in case a film, a photovoltaic cell, and a substrate are laminated by the restoration resin layer, it can manufacture easily and efficiently the solar cell module of substrate structure and super straight structure.
[0052] This invention until a restoration resin layer hardens and constructs a bridge, in case a surface film, a photovoltaic cell, and a rear-face film are laminated by the restoration resin layer A surface film circumference edge, heating, after hardening and constructing a bridge Or the direction of a rear-face film, Since it is the manufacture approach of the solar cell module characterized by maintaining the condition of having pressurized the rear-face film circumference edge at the direction of a surface film or a front face, and rear-face film both directions, the solar cell module of front flesh-side film structure can be manufactured easily and efficiently.
[0053] Thus, according to this invention, it can respond to a frame-less solar cell module suitably.

[Description of the Prior Art]

A solar cell module is the aggregate which connected the photovoltaic cell. However, there is a problem in using it outdoors from a viewpoint of the engine performance on the strength, damp-proof ability, and the insulating engine performance in a photovoltaic cell simple substance. For this reason, as shown in drawing 7 , it is almost the case which is constituted with a front cover 61, the back covering 62, restoration resin 63, and the circumference edge sealing agent 64 so that the engine performance (based on a front cover 61 or the back covering 62) on the strength, damp-proof ability (based on a front cover 61, the back covering 62, and the circumference edge sealing agent 64), and the insulating engine performance (based on a front cover 61, the back covering 62, restoration resin 63, and the circumference edge sealing agent 64) may be secured. The restoration resin 63 currently used here has the point which poses a problem as an electric product that water will penetrate instead of having the light transmission engine performance and ultraviolet resistance ability, and the insulating engine performance. For this reason, the approach of closing the circumference edge of a solar cell module is

offered variously that it should prevent that the moisture content which becomes a problem trespasses upon the restoration resin 63 interior.
[0003] Moreover, as the manufacture approach of a solar cell module, as shown in drawing 8 , on the hot platen around 130 degrees C, the vacuum press is performed and temporary adhesion of what was accumulated in order of a front cover 61 (or back covering 62), sheet-like restoration resin 63 (EVA resin etc.), a photovoltaic cell 60, sheet-like restoration resin 63 (EVA resin etc.), and the back covering 62 (or front cover 61) is carried out. The method of hardening and pasting this up in the oven around 150 degrees C, and finally attaching a circumference edge sealing agent is in use.
[0004] There are various kinds of methods shown in drawing 9 thru/or drawing 12 in the closure approach by the circumference edge sealing agent. These methods are outlined below.
(1) The compression closure method 1 (refer to drawing 9) by the frame : the approach which attach Frame D where member 64a (isobutylene isoprene rubber, resin foam, etc.) which has the closure engine performance by being compressed is twisted around the perimeter edge of a solar cell module 6 in which the frame is not attached, and closes by performing eye a flask clamp. In addition, in drawing 9 and drawing 10 , drawing (a) is a decomposition perspective view showing the whole solar cell module 6, and drawing (b) is a XX sectional view in drawing (a).
(2) The compression closure method 2 (refer to drawing 10) by the frame : the approach which closes by performing eye a flask clamp where member 64a (isobutylene isoprene rubber, resin foam, etc.) which has the closure engine performance by being compressed into Frame D is attached.
(3) Sealing agent spreading method 1 (refer to drawing 11) : how to pour in and close sealing agent 64b (silicone resin, adhesives, etc.), after Frame D is attached.
(4) Sealing agent spreading method 2 (refer to drawing 12) : the method which applies sealing agent 64b (silicone resin, adhesives, etc.) to the perimeter edge of a solar cell module 6 in which the frame is not attached, and is closed (refer to drawing 12 (a) and (b)). In addition, when a frame is required, a frame is attached after sealing agent 64b spreading.

[Effect of the Invention]

As explained above the solar cell module of this invention In the solar cell module which arranged the front cover to the light-receiving side side of a photovoltaic cell, arranged back covering on the opposite side side, and prepared the restoration resin layer between each covering and a photovoltaic cell Since a front cover and back covering are joined by the periphery of said solar cell module and it is characterized by the thing of a front cover and back covering for which the periphery of a restoration resin layer was closed in either at least The closure of the circumference edge of a solar cell module can be performed only in a front cover, back covering, and a restoration resin layer. Therefore, there is almost no exposure of a restoration resin layer in the edge of a solar cell module, and the moisture content penetrated from the interior of a restoration resin layer to a photovoltaic cell can be made to decrease sharply. Moreover, while another member for closing the circumference edge of a solar cell module is unnecessary and can reduce ingredient cost, it is reducible like the fitter of another member for the edge closures. Furthermore, it is effective also in the module which has an acute angle triangular module part.

[0049] Since this invention is applied also when using a front cover as a film, using back covering as a substrate, using a front cover as a substrate, using back covering as a film, using a front cover as a surface film and using back covering as a rear-face film, it is applicable also to the solar cell module of the so-called substrate structure, super straight structure, and front flesh-side film structure.
[0050] When an inactive member is prepared between a front cover and back covering, the closure of the circumference edge of a solar cell module can be performed by the front cover, back covering, the restoration resin layer, and the inactive member, and the restoration resin layer exposure product of the periphery of a front cover and back covering can be made into the minimum.
[0051] Since this invention is the manufacture approach of the solar cell module characterized by to maintain the condition pressurized the film circumference edge in the direction of a substrate, or to pressurize a film in the direction of a substrate in a field, heating after hardening and constructing a bridge until a restoration resin layer hardens and constructs a bridge or in case a film, a photovoltaic cell, and a substrate are laminated by the restoration resin layer, it can manufacture easily and efficiently the solar cell module of substrate structure and super straight structure.
[0052] This invention until a restoration resin layer hardens and constructs a bridge, in case a surface film, a photovoltaic cell, and a rear-face film are laminated by the restoration resin layer A surface film circumference edge, heating, after hardening and constructing a bridge Or the direction of a rear-face film, Since it is the manufacture approach of the solar cell module characterized by maintaining the condition of having pressurized the rear-face film circumference edge at the direction of a surface film or a front face, and rear-face film both directions, the solar cell module of front flesh-side film structure can be manufactured easily and efficiently.
[0053] Thus, according to this invention, it can respond to a frame-less solar cell module suitably.

[Problem(s) to be Solved by the Invention]

However, by the compression closure method by the above-mentioned frame, a frame is needed and it cannot respond to a frame-less solar cell module with the increasing present needs.
[0006] Moreover, by the sealing agent spreading method, there was a problem that the cleaning at the time of adhering to the location I do not want a sealing agent to adhere which requires the time amount which applies and stiffens a sealing agent and which soils the inside of a production process took time and effort etc.
[0007] Furthermore, since another member for closing was needed, each above-mentioned method also had the trouble that cost started.
[0008] This invention is created in view of the above situations, and aims at offer of the solar cell module which can perform the circumference edge closure of a solar cell module only in a front cover, back covering, and a restoration resin layer, and its manufacture approach.

[Means for Solving the Problem]

In order to attain the above-mentioned purpose, a front cover is allotted to the light-receiving side side of a photovoltaic cell, back covering is arranged on the opposite side side, a front cover and back covering are joined by the periphery of said solar cell module in the solar cell module with which the restoration resin layer was prepared between each covering and a photovoltaic cell, and this invention is characterized by the thing of a front cover and back covering done for the closure of the periphery of a restoration resin layer in either at least.

[0010] According to this invention, the closure of the periphery of a solar cell module can be performed only in a front cover, back covering, and a restoration resin layer.

[0011] It is characterized by for said front cover consisting of a film in this invention, and said back covering consisting of a substrate.

[0012] According to this invention, the closure of the periphery of the so-called solar cell module of substrate structure can be performed only in a film, a substrate, and a restoration resin layer.

[0013] It is characterized by for said front cover consisting of a substrate in this invention, and said back covering consisting of a film.

[0014] According to this invention, the closure of the periphery of the so-called solar cell module of super straight structure can be performed only in a film, a substrate, and a restoration resin layer.

[0015] It is characterized by for said front cover consisting of a surface film in this invention, and said back covering consisting of a rear-face film.

[0016] According to this invention, the closure of the periphery of the solar cell module of front flesh-side film structure can be performed only in a surface film, a rear-face film, and a restoration resin layer.

[0017] A front cover is allotted to the light-receiving side side of a photovoltaic cell, back covering is arranged on that opposite side side, an inactive member is prepared between a front cover and back covering by the periphery of said solar cell module in the solar cell module with which the restoration resin layer was prepared between each covering and a photovoltaic cell, and this invention is characterized by the closure of the periphery of a restoration resin layer being carried out by this inactive member.

[0018] According to this invention, the closure of the periphery of a solar cell module can be performed by the front cover, back covering, the restoration resin layer, and the inactive member.

[0019] This invention is the manufacture approach of a solar cell module, and it is characterized by maintaining the condition of having pressurized the film circumference edge in the direction of a substrate until a restoration resin layer hardens and constructs a bridge, in case a film, a photovoltaic cell, and a substrate are laminated by the restoration resin layer.

[0020] This invention is the manufacture approach of a solar cell module, and after it laminates a film, a photovoltaic cell, and a substrate by the restoration resin layer and a restoration resin layer hardens and constructs a bridge, it is characterized by pressurizing a film circumference edge in the direction of a substrate, heating.

[0021] This invention is characterized by pressurizing a film in the direction of a substrate in a field in the manufacture approach of a solar cell module.

[0022] According to this invention, field contact of a film and the substrate can be carried

out without a clearance.
[0023] This invention is the manufacture approach of a solar cell module, and it is characterized by maintaining the condition of having pressurized the direction of a rear-face film, and the rear-face film circumference edge for the surface film circumference edge at the direction of a surface film or a front face, and rear-face film both directions until a restoration resin layer hardens and constructs a bridge, in case a surface film, a photovoltaic cell, and a rear-face film are laminated by the restoration resin layer.
[0024] This invention is the manufacture approach of a solar cell module, and it is characterized by maintaining the condition of having pressurized the direction of a rear-face film, and the rear-face film circumference edge for the surface film circumference edge at the direction of a surface film or a front face, and rear-face film both directions, heating, after it laminates a surface film, a photovoltaic cell, and a rear-face film by the restoration resin layer and a restoration resin layer hardens and constructs a bridge.
[0025]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to drawing.
[0026] A front cover 2 is allotted to the light-receiving side side of a photovoltaic cell 5, the back covering 3 is arranged on the opposite side side, and, as for the solar cell module 1 of this invention, it comes to prepare the restoration resin layer 4 between each coverings 2 and 3 and a photovoltaic cell 5.
[0027] First, the gestalt of operation of the 1st of this invention is explained. A front cover 2 is the so-called solar cell module 1 of the substrate structure where the film 20 with the transparent gestalt of this operation and the back covering 3 consist of substrates 30. Drawing 1 is the expanded sectional view of the circumference edge of the solar cell module 1 concerning the gestalt of this operation.
[0028] EVA resin etc. is suitably used for the restoration resin which forms a transparence TEDORA film etc. in a film 20, and forms the restoration resin layers 4, such as an aluminum plate, in a substrate 30.
[0029] The film 20 touches over the perimeter of the periphery of a substrate 30 that there is no clearance in a substrate 30, and the closure of the periphery of the restoration resin layer 4 is planned. In addition, the edge of the periphery of a substrate 30 is sufficient as a film 20 contacting a substrate 30, and it may be carrying out field contact that there is no clearance in a substrate 30.
[0030] Although the solar cell module of the conventional substrate structure was shown in drawing 13 , it was the structure which the restoration resin outcrop 600 which moisture penetrates has elegance in a circumference edge, and has a problem the way things stand conventionally [this] on weatherproof ability (on the engine performance it is made for moisture not to penetrate to a photovoltaic cell through restoration resin). However, in the solar cell module 1 concerning the gestalt of this operation, in a circumference edge, there is almost no exposure of the restoration resin layer 4, and it has the structure of making the moisture content penetrated to a photovoltaic cell 5 decreasing sharply. Moreover, it becomes unnecessary [another member for the edge closure which was the need conventionally].
[0031] Next, the gestalt of operation of the 2nd of this invention is explained. A front cover 2 is the so-called solar cell module 1 of the super straight structure where the substrate 21 with the transparent gestalt of this operation and the back covering 3 consist

of films 31. Drawing 2 is the expanded sectional view of the circumference edge of the solar cell module 1 concerning the gestalt of this operation.
[0032] EVA resin etc. is suitably used for the restoration resin which forms glass etc. in a substrate 21 and forms the restoration resin layer 4, such as a white film, in a film 31.
[0033] The film 31 touches over the perimeter of the periphery of a substrate 21 that there is no clearance in a substrate 21, and the closure of the periphery of the restoration resin layer 4 is planned. In addition, the edge of the periphery of a substrate 21 is sufficient as a film 31 contacting a substrate 21, and it may be carrying out field contact that there is no clearance in a substrate 21.
[0034] It was the structure which the restoration resin outcrop 600 which moisture penetrates has elegance in a circumference edge, and has a problem the way things stand conventionally [this] on weatherproof ability (on the engine performance it is made for moisture not to penetrate to a photovoltaic cell through restoration resin) like [although the solar cell module of the conventional super straight structure is shown in drawing 14] the thing of the above-mentioned substrate structure. However, in the solar cell module 1 concerning the gestalt of this operation, in a circumference edge, there is almost no exposure of the restoration resin layer 4, and it has the structure of making the moisture content penetrated to a photovoltaic cell 5 decreasing sharply. Moreover, it becomes unnecessary [another member for the edge closure which was the need conventionally].
[0035] Next, the gestalt of operation of the 3rd of this invention is explained. The surface film 22 with the gestalt of this operation transparent [a front cover 2] and the back covering 3 consist of rear-face films 32. Drawing 3 is the expanded sectional view of the circumference edge of the solar cell module 1 concerning the gestalt of this operation.
[0036] EVA resin etc. is suitably used for the restoration resin which forms the restoration resin layer 4, such as a white film, in the rear-face films 32, such as a transparence TEDORA film, at the surface film 22.
[0037] The surface film 22 touches over the perimeter of the periphery of the rear-face film 32 that there is no clearance in the rear-face film 32, and the closure of the periphery of the restoration resin layer 4 is planned.
[0038] It was the structure which the restoration resin outcrop 600 which moisture penetrates has elegance in a circumference edge, and has a problem the way things stand conventionally [this] on weatherproof ability (on the engine performance it is made for moisture not to penetrate to a photovoltaic cell through restoration resin) like [although the conventional solar cell module corresponding to the gestalt of this operation to drawing 15 is shown] the conventional article of the above-mentioned substrate structure and super straight structure. However, in the solar cell module 1 concerning the gestalt of this operation, in a circumference edge, there is almost no exposure of the restoration resin layer 4, and it has the structure of making the moisture content penetrated to a photovoltaic cell 5 decreasing sharply. Moreover, it becomes unnecessary [another member for the edge closure which was the need conventionally].
[0039] Next, it explains, referring to drawing 6 about the gestalt of operation of the 4th of the solar cell module 1 concerning this invention.
[0040] The inactive member 41 is formed between a front cover 2 and the back covering 3 by the periphery of a solar cell module 1, and, as for the gestalt of this operation, the closure of the periphery of the restoration resin layer 4 is carried out by this inactive member 41.

[0041] Drawing 6 (a) shows that by which the inactive members 41 (glass fabrics etc.) are formed between the film 20 and the substrate 30 by the periphery of a solar cell module 1 about the solar cell module 1 of the substrate structure of pasting up and stiffening substrate 30, restoration resin layer 4, photovoltaic cell 5, and a film 20, or super straight structure. Moreover, drawing 6 (b) shows that by which the inactive members 41 (glass fabrics etc.) are formed between the film 22 and the film 32 by the periphery of a solar cell module 1 about the solar cell module 1 of the front flesh-side film structure of pasting up and stiffening a film 22, and 32, restoration resin layer 4 and a photovoltaic cell 5. By preparing this inactive member 41, front cover 2, and back covering 3, and manufacturing a solar cell module 1, most exposure of the restoration resin layer 4 between the front cover 2 of a solar cell module 1 circumference edge and the back covering 3 can be lost. if a fluid good thing is used here as restoration resin which forms the restoration resin layer 4, without it will leave air bubbles etc. to the interior of the inactive member 41 -- an exterior -- it is finely producible. In addition, the films 20, 22, and 32 and the restoration resin layer 4 which have overflowed solar cell module 1 dimension are excised after restoration resin layer 4 hardening.
[0042] Next, the 1st thru/or the manufacture approach of the solar cell module 1 of the gestalt the 3rd operation are explained, referring to drawing 4 and drawing 5 .
[0043] Drawing 4 (a) is drawing in which using Fixture A for and showing how to carry out pressurization processing of the film 20 circumference edge in the substrate 30 direction, in order to be in the condition re-softened the restoration resin layer 4 after adhesion, to use the edge of a substrate 30 circumference edge and to reduce exposure of restoration resin layer 4 edge, when carrying out temporary adhesion of a substrate 30, the restoration resin layer 4, a photovoltaic cell 5, and the film 20 on the hot platen around 120 degrees C or.
[0044] Drawing 4 (b) is drawing showing how to almost lose the restoration resin layer 4 between a substrate 30 and a film 20, in order to use the tooth space from photovoltaic cell 5 edge to substrate 30 edge, to use Fixture B in the substrate 30 direction, to pressurize a film 20 in it in a field and to reduce exposure of restoration resin layer 4 edge. The film 20 and the restoration resin layer 4 overflowing from a substrate 30 circumference edge are excised after restoration resin layer 4 hardening.
[0045] In addition, although the above-mentioned manufacture approach explained substrate structure, it is the same also about super straight structure.
[0046] Drawing 5 is in the condition of having re-softened the restoration resin layer 4 after adhesion when carrying out temporary adhesion of the surface film 22, the restoration resin layer 4, a photovoltaic cell 5, and the rear-face film 32 on the hot platen around 120 degrees C. In order to use the tooth space from photovoltaic cell 5 edge to a film 22 and 32 edges, to use Fixture C in a film 22 and the 32 phase directions, to pressurize in a field and to reduce exposure of restoration resin layer 4 edge, they are a film 22 and drawing showing how to almost lose the restoration resin layer 4 between 32. The films 22 and 32 and the restoration resin layer 4 which have overflowed solar cell module 1 dimension are excised after restoration resin layer 4 hardening.
[0047] Moreover, the high-speed bridge formation article of restoration resin is developed by development of a technique in recent years. This high-speed bridge formation article can paste up and harden completely a substrate, restoration resin, and a photovoltaic cell film at the process only for carrying out temporary adhesion. It is also

possible to maintain the condition of having pressurized using this high-speed bridge formation article so that a clearance might not almost be produced between the front cover of a solar cell module circumference edge and back covering, and to harden and paste up restoration resin.

[Brief Description of the Drawings]

[Drawing 1] It is the expanded sectional view of the circumference edge of the solar cell module of the substrate structure concerning the gestalt of operation of this invention.
[Drawing 2] It is the expanded sectional view of the circumference edge of the solar cell module of the super straight structure concerning the gestalt of operation of this invention.
[Drawing 3] It is the expanded sectional view of the circumference edge of the solar cell module of the front flesh-side film structure concerning the gestalt of operation of this invention.
[Drawing 4] It is drawing showing the manufacture approach of the solar cell module of the substrate concerning this invention, and super straight structure.
[Drawing 5] It is drawing showing the manufacture approach of the solar cell module of the front flesh-side film structure concerning this invention.
[Drawing 6] It is the circumference edge expanded sectional view of a solar cell module which performed the circumference edge closure using the inactive member.
[Drawing 7] It is drawing showing the configuration of the conventional solar cell module.
[Drawing 8] It is the manufacture approach **** Fig. of the conventional solar cell module.
[Drawing 9] It is drawing showing the circumference edge closure approach of the conventional solar cell module.
[Drawing 10] It is drawing showing the circumference edge closure approach of the conventional solar cell module.
[Drawing 11] It is drawing showing the circumference edge closure approach of the conventional solar cell module.
[Drawing 12] It is drawing showing the circumference edge closure approach of the conventional solar cell module.
[Drawing 13] It is the expanded sectional view of the circumference edge of the solar cell module of the conventional substrate structure.
[Drawing 14] It is the expanded sectional view of the circumference edge of the solar cell module of the conventional super straight structure.
[Drawing 15] It is the expanded sectional view of the circumference edge of the solar cell module of the conventional front flesh-side film structure.
[Description of Notations]
1 Solar Cell Module
2 Front Cover
20 Film
21 Substrate
22 Surface Film

3 Back Covering
30 Substrate
31 Film
32 Rear-Face Film
4 Restoration Resin Layer
41 Inactive Member
5 Photovoltaic Cell

【図面の簡単な説明】

【図１】本発明の実施の形態に係るサブストレート構造の太陽電池モジュールの周辺端部の拡大断面図である。

【図２】本発明の実施の形態に係るスーパーストレート構造の太陽電池モジュールの周辺端部の拡大断面図である。

【図３】本発明の実施の形態に係る表裏フィルム構造の太陽電池モジュールの周辺端部の拡大断面図である。

【図４】本発明に係るサブストレート及びスーパーストレート構造の太陽電池モジュールの製造方法を示す図である。

【図５】本発明に係る表裏フィルム構造の太陽電池モジュールの製造方法を示す図である。

【図６】不活性部材を用いて周辺端部封止を行った太陽電池モジュールの周辺端部拡大断面図である。

【図７】従来の太陽電池モジュールの構成を示す図である。

【図８】従来の太陽電池モジュールの製造方法示す図である。

【図９】従来の太陽電池モジュールの周辺端部封止方法を示す図である。

【図１０】従来の太陽電池モジュールの周辺端部封止方法を示す図である。

＊【図１１】従来の太陽電池モジュールの周辺端部封止方法を示す図である。

【図１２】従来の太陽電池モジュールの周辺端部封止方法を示す図である。

【図１３】従来のサブストレート構造の太陽電池モジュールの周辺端部の拡大断面図である。

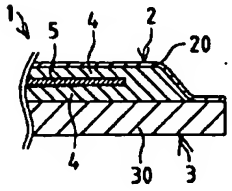
【図１４】従来のスーパーストレート構造の太陽電池モジュールの周辺端部の拡大断面図である。

【図１５】従来の表裏フィルム構造の太陽電池モジュールの周辺端部の拡大断面図である。

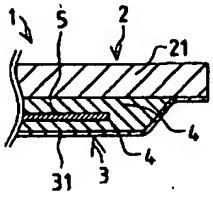
【符号の説明】

1	太陽電池モジュール
2	フロントカバー
２０	フィルム
２１	基板
２２	表面フィルム
3	バックカバー
３０	基板
３１	フィルム
３２	裏面フィルム
4	充填樹脂層
４１	不活性部材
5	太陽電池セル

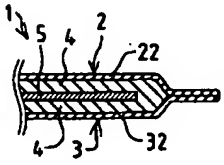
【図１】



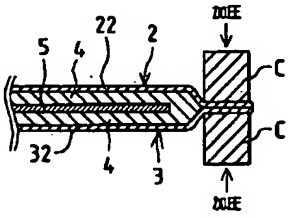
【図２】



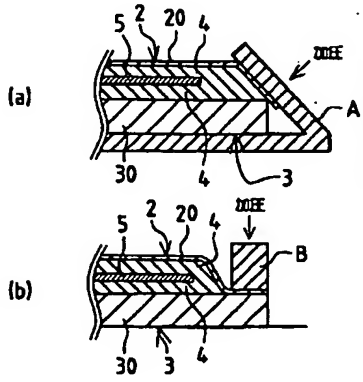
【図３】



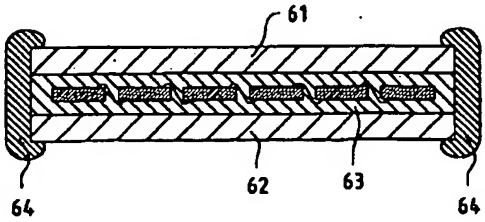
【図５】



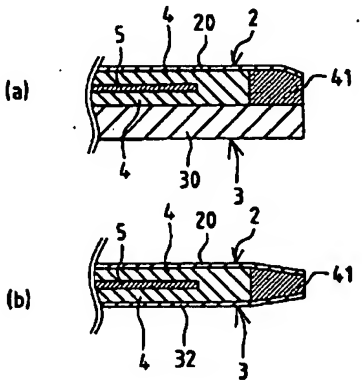
【図４】



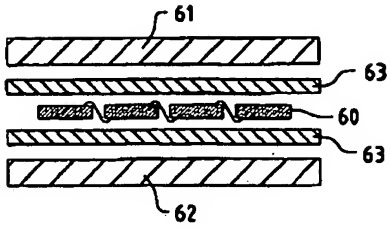
【図７】



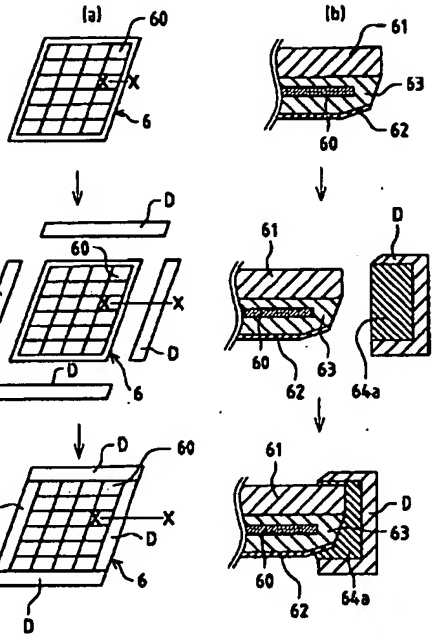
【図6】



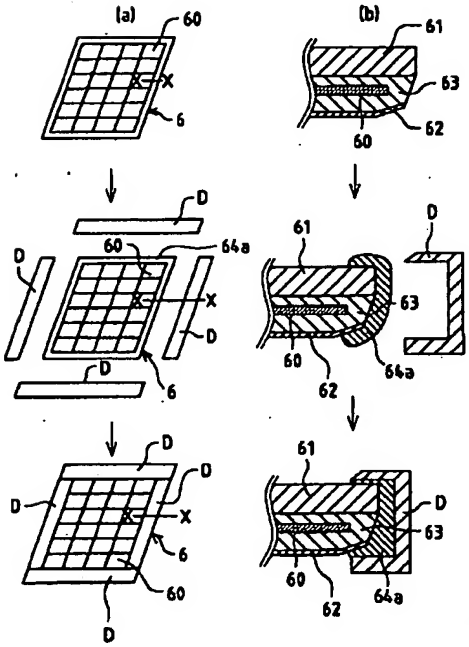
【図8】



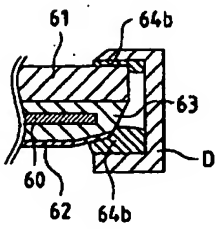
【図10】



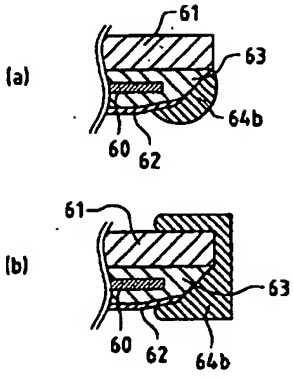
【図9】



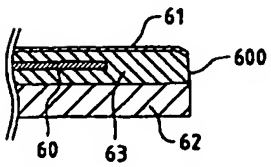
【図11】



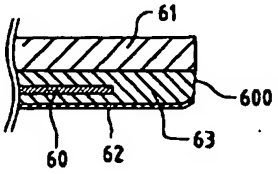
【図12】



【図13】



【図１４】



【図１５】